AN ROINN
IASCAIGH AGUS FORAOISEACHTA

A review of the national sea trout catch by Edward Fahy

Fishery leaflet No. 113

A REVIEW OF THE NATIONAL SEA TROUT CATCH

BY

EDWARD FAHY

ISSUED BY
TRADE AND INFORMATION SECTION
DEPARTMENT OF FISHERIES AND FORESTRY
DUBLIN 2

TELEPHONE NO. 789011

Fishery Leaflet 113

Abstract

Statistical coverage of the sea trout catch is not so comprehensive as for salmon but a number of recent studies, providing information on aspects of the national or regional catches, are available for comparison with official catch statistics.

The proportion of the official catch attributed to drift nets in the post 1968 period is thought to have been overstated.

Draft nets account for a large proportion of the catch, averaging 29% in the 1970s but rod and line take the largest share of the fish, varying between an average of 47% in the 1940s to 66% of the national catch in the 1960s. Estimated catch has risen with the number of rod licences and two phases in these statistics have been noted: prior to 1959 and thereafter. On the other hand both official figures for the mean weight of catch per licence issued in the Connemara district and the catch per rod day recorded by fishery managers there have declined since 1927.

Analysis of the national catch on the basis of licence returns in 1980 indicates that 8 tonnes of sea trout were taken by draft, 0.25 tonnes by drift nets and less than 51 tonnes by rod and line.

A Review of the National Sea Trout Catch

Edward Fahy

Introduction

Periodic statistical surveys of the Irish salmon industry have been carried out by Southern (1934) and Went (1938, 1956 and 1967) but the sea trout catch has not received similar attention. A reason for this is the relative scarcity of data on the smaller species. An important source of information for both salmon and sea trout are the departmental* statistics published biennially from 1927 to 1945 and thereafter annually. For sea trout the data are estimates based on information taken from licence returns which must be supplied to the Department of Fisheries and Forestry in accordance with the provisions of the Statistics Act of 1926. The 1934 Departmental Report contains the statement:

> "Returns made by the holders of rod licences are not yet satisfactory. Their collection is not easy owing to the difficulty of establishing contact with visiting anglers at the time the statistics become due ....."

As the rod catch contributes a large proportion of sea trout landings this method of statistical collection is a major disincentive to further perusal of the figures.

This consideration of the sea trout catch is prompted by the availability of several studies on migratory trout and salmon in the recent past. Much emphasis in the departmental reports has been laid on the angling returns of the Connemara fishery district which is frequently referred to as the leading or premier sea trout district and the catch per licence is given over a number of years. Comparison can now be made with detailed catches from private fisheries in this district (Fahy, 1978 b) and with one fishery in the adjoining Galway district (Fahy, 1979 a).

---

*Department responsible for fisheries.

Three Economic and Social Research Institute papers on the salmon industry contain figures referring to sea trout (O'Connor and Whelan, 1973; O'Connor, Whelan and McCashin, 1974 and Whelan, O'Connor and McCashin, 1974) and finally there are data describing the relationship between climatic factors and sea torut production which give an indication of trends in sea trout availability (Fahy, 1980 a, 1981).

Methods of capture

Rod and line and draft net account for the majority of sea trout landed but the fish are taken as a by-catch of all methods used for the capture of salmon. In the official statistics the contributions made by rod and draft net are separately identified and the drift net catch is usually but not invariably distinguished. "Other methods" which sometimes include the drift net component are not further broken down. Other methods could very well include the takings of seven different kinds of engine which cannot of course be identified in the overall figures. Stake nets and weirs are usually the methods of capture specified within this grouping although drift net figures are occasionally included. In 1933 20% of the total sea trout catch originated in "stake nets, weirs etc." but otherwise the figures have been much lower and in the 1970's, landings from these engines have considerably declined, in terms of the actual weights recorded as well as the proportion of the catch attributed to these engines.

The drift net catch

Went (1956) described the mesh size used by drift netters as being very much a matter of choice but varying between $2\frac{1}{2}$ and 3 inches (5.6 - 7.6cm) (knot to knot). This mesh he claimed was suitable for taking fish of between 3 and 8lbs in weight (1.4 to 8.6kg). Southern (1934) had described a net mesh of $2\frac{1}{2}$ inches, knot to knot, as most suitable for taking fish of between 5 and 8 lbs (2.3 - 3.6kg). A survey of almost 2,000 sea trout taken be drift net off the south west coast (Fahy, 1977) revealed that the smallest was 3.1lbs (1.4kg) and the overall average weight was 4.6lbs (2.1kg).

For simplicity the sea trout most likely to mesh in a drift net may be regarded as a previous spawner* so that when the vulnerability of sea trout to this form of capture is considered a comment on the occurrence of previously spawned fish in the stocks is apposite.

With the single exception of the Waterville fishery in Co. Kerry, Irish sea trout stocks are short lived and consequently their average weight and the numbers of spawners the stocks contain is small. It has been estimated that the number of previous spawners within the Connemara stocks are probably in the vicinity of 4% (Fahy, 1978 b) while in the Moy Fishery a recent investigation indicates the figure to be as low as 2% (Fahy, 1979 b). These facts suggest that there are few sea trout of sufficiently large size to be captured by salmon drift nets and further details support the unlikelihood of a large proportion of sea trout landings deriving from these engines.

Sea trout run into freshwater in a sequence of descending size which can be related to feeding activity (Fahy, 1980 c). The largest pre-spawned and previously spawned fish enter in the early spring at a time when drift nets, although entitled to fish, do not do so in any number. Because of the relatively small size of post smolt and adult fish remaining at sea during the summer months when drift netters are most active these sea trout, which are too small to mesh, are largely unaffected by the nets. The sea trout of the Currane fishery in Co. Kerry were found to contain as large a proportion of previous spawners in the mid 1970's as during the early 1940's when similar stock description work was carried out (Fahy, 1980 b) so that the effects of drift netting are not obvious in that stock. During the earlier years of the official statistics the percentage of sea trout landings attributed to drift nets averaged at 3% by weight but this figure increased with the growth of drift nets.

---

*The reasoning for this statement is as follows: A batch of slim bodied Atlantic feeding sea trout with an average weight of 4 lbs (1.8kg) consists of 90% previously spawned fish (Fahy, 1978 a) whereas in a batch of fish of similar weight from the Irish Sea 50% have spawned at least once. However the sea trout catch is relatively small along the eastern seaboard (Fahy, in press) and the most extensive drift net fisheries occur off the southern and western parts of the coast where Atlantic feeding fish predominate (Fahy, 1978 a).

For the years in which the sea trout drift net catch is separately identified the percentage of the landings by this method was:

Period	Number of years considered	Percentage	S.D.
1927 - 1967	28	2.6	2.04
1968 - 1972	4	6.6	1.70
1973 - 1978	6	22.0	14.80

The number of years considered refers to the number of years in which the official statistics distinguished between drift nets and other commercial methods. Thus for the period of the official statistics there would appear to have been three phases in the catch history: a period of stability up to 1967, a time of increasing drift net contribution to the catch from 1968 to 1972 and thereafter a large annual contribution by the drift nets to the weight of sea trout landed. The ratio of increase can be expressed as 2.5 between phases 1 and 2 and 8.5 between phases 1 and 3.

The contribution of the drift nets to the national salmon catch by weight during the same periods was:

Period	Number of years considered	Percentage	S.D.
1927 - 1967	31	19.6	5.85
1968 - 1972	5	50.0	9.25
1973 - 1978	6	70.7	3.20

Again the ratio of increase between phases 1 and 2 was 2.6 and between phases 1 and 3 was 3.6. In other words, on the official statistics, the relative increase in the drift net catch of sea trout has been greater than the contribution of this engine to salmon landings. A relatively greater increase in the drift net percentage contribution to the landings expressed in terms of weight would however be expected; the average weight of rod caught sea trout in parts of the west coast is less than 1lb (0.46kg) (Fahy, 1978 b) while, as

One must look therefore at the actual weight of salmon and sea trout taken annually by this method:

Period	Salmon	Sea trout
	kg	
1927 - 1967	190,000	885
1968 - 1972	767,727	3,201
1973 - 1978	769,091	11,618

Thus the ratio of increase in the actual weight of salmon landed by drift netters was 4.0 between phases 1 and 2, and 4.0 between phases 1 and 3. For sea trout the ratio is 3.6 between phases 1 and 2, and 13 between phases 1 and 3. However the expansion of drift netting in the 1970s prompted a more detailed appraisal of its consequences for sea trout than hitherto so that the increase between phases 1 and 3 possibly reflects an underestimate of catches by this means prior to 1972.

The draft net catch

In all years prior to 1973 draft nets and rod and line account for, between them, more than 85% and usually more than 90%, of the annual sea trout landings. The exceptional years, 1973, 1976 and 1977, were due to a large proportion of the catch being attributed to drift nets. The effort by draft nets has not fluctuated as widely as drift nets, the other important means of commercial capture. Licences issued varied between a minimum of 589 in 1961 and 1962 to a maximum of 850 in 1950, a range of 44% (Fig. 1). The consequences for the draft net fishery of the growth of the drift net effort for salmon have been demonstrated (Whelan, O'Connor and McCashin, 1974) but the sea trout takings by these nets appear to have held up well. Since 1950 there appears to have been an upward trend in the weight of sea trout taken per draft net licence issued and from the late 1960s the catch reaches hitherto unattained heights. As a percentage of the total sea trout landings the draft net takings rose from an annual average during the late 1920s and 1930s of 37% to 49% in the 1940s declining thereafter as the rod catch became more important to 31% in the 1950s, 29% in the 1960s and 29% in the 1970s.

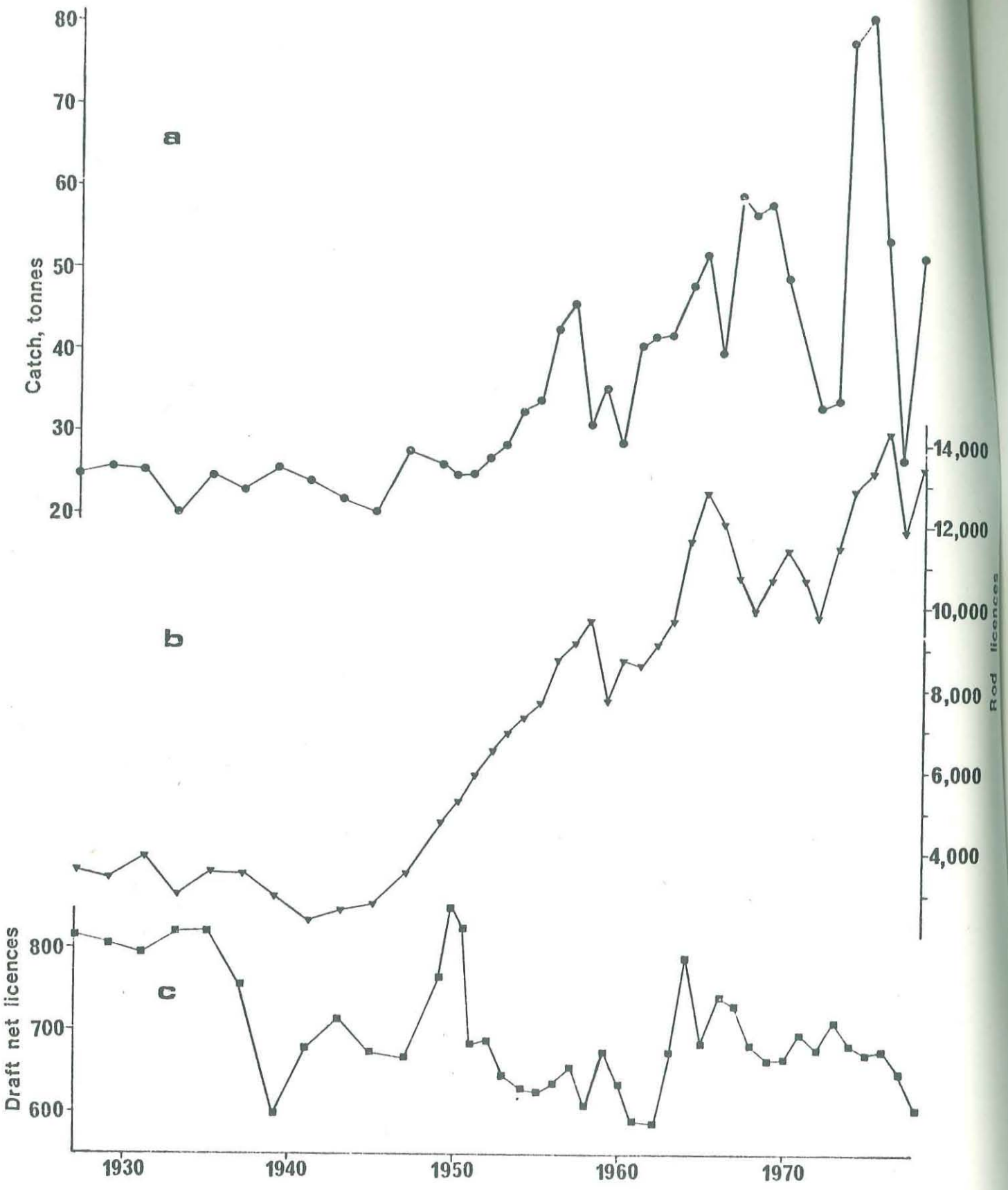

Fig.1 a, Recorded National sea trout catch, b, Rod licences (all categories) and c, draft net licences issued between 1927 and 1978.

Catch by rod and line

In percentage terms the proportion of the total national sea trout catch taken by rod and line averaged as follows:

Period	Number of years averaged	Mean percentage	S.D.
until 1939	7	55.5	10.6
1940s	7	47.0	7.1
1950s	10	62.4	5.6
1960s	10	66.1	8.0
1970s (to 1978)	9	53.2	9.7

So rod and line has at any time been the most important method of capturing sea trout. From Fig. 1 it can be seen that the catch has risen with the number of rod licences issued and because the draft net catch has not fluctuated so much from year to year, total sea trout landings correlate with the number of rod licences issued. Several correlations have been attempted between the number of rod licences issued nationally (x) and the weight of catch in kg (y).

Period	N	r	P	slope	intercept.
1927 - 1978	42	.7844	<0.001	3.16	11,842
1927 - 1959	23	.8266	<0.001	2.29	15,908
1960 - 1978	19	.4805	<0.05	4.19	751
1970 - 1978	9	.6064	Not sig.	8.03	48,327

The correlation for the entire period of the records is highly significant but there are known to be two distinct phases to these records. Prior to 1959 rod licences were of 4 different kinds, thereafter 9. Went (1967) stated:

> "The mean catch (of salmon) per (rod) licence figures for the period 1945/1958 can be regarded as calculated on a consistent basis and those for the period 1959/63 on another consistent basis. Unfortunately it is not possible to give the relationship between the two sets of figures because of the change in the licensing system from 1959 onwards."

During the period following 1960 the correlation is not so strong and in the 1970s the relationship is lost altogether.

The rod and line sea trout catch is discussed hereunder with particular reference to the figures in the Connemara fishery area for several reasons. Firstly, this is the region frequently referred to in the official reports as the premier or leading sea trout district; figures for the catch per licence are frequently set out as indicators of trends in angling success. Within the Connemara fishery district sea trout greatly outnumber and usually outweigh the salmon catch. Traditionally these sea trout have been regarded as an angler's rather than a commercial species and in recognition of this fact a bye law (No. 546) stipulates that drift nets should be of sufficiently large mesh size to avoid the capture of these fish which have a predominantly low weight and small size.

The Connemara region is exceptionally well documented, catch records for some of its fisheries going back to the mid nineteenth century. In the best documented fisheries which together occupy some 50% of the land surface of the fishery district it is possible to attribute the majority of fish caught since 1900 to specific captors (Fahy, 1978 b). Catches in certain of the Connemara fisheries were depressed during the wars and this trend is obvious also in the official returns. It was during the same period that the draft net share of the total catch increased. After 1950 the official statistics suggest a gradual downward trend in the Connemara rod takings with the exception of 1978which with a total catch of 12,468kg. is twice as high as the best catch in any other recorded year. However the number of sea trout returned by the district inspector in 1978 was 9,879 which, at an average weight of 0.75lbs (0.34kg) would amount to a weight of 3,368 kg. The district inspector in Connemara compiles his figures from the totals captured in individual fisheries and these are probably something of an understatement of the true position.

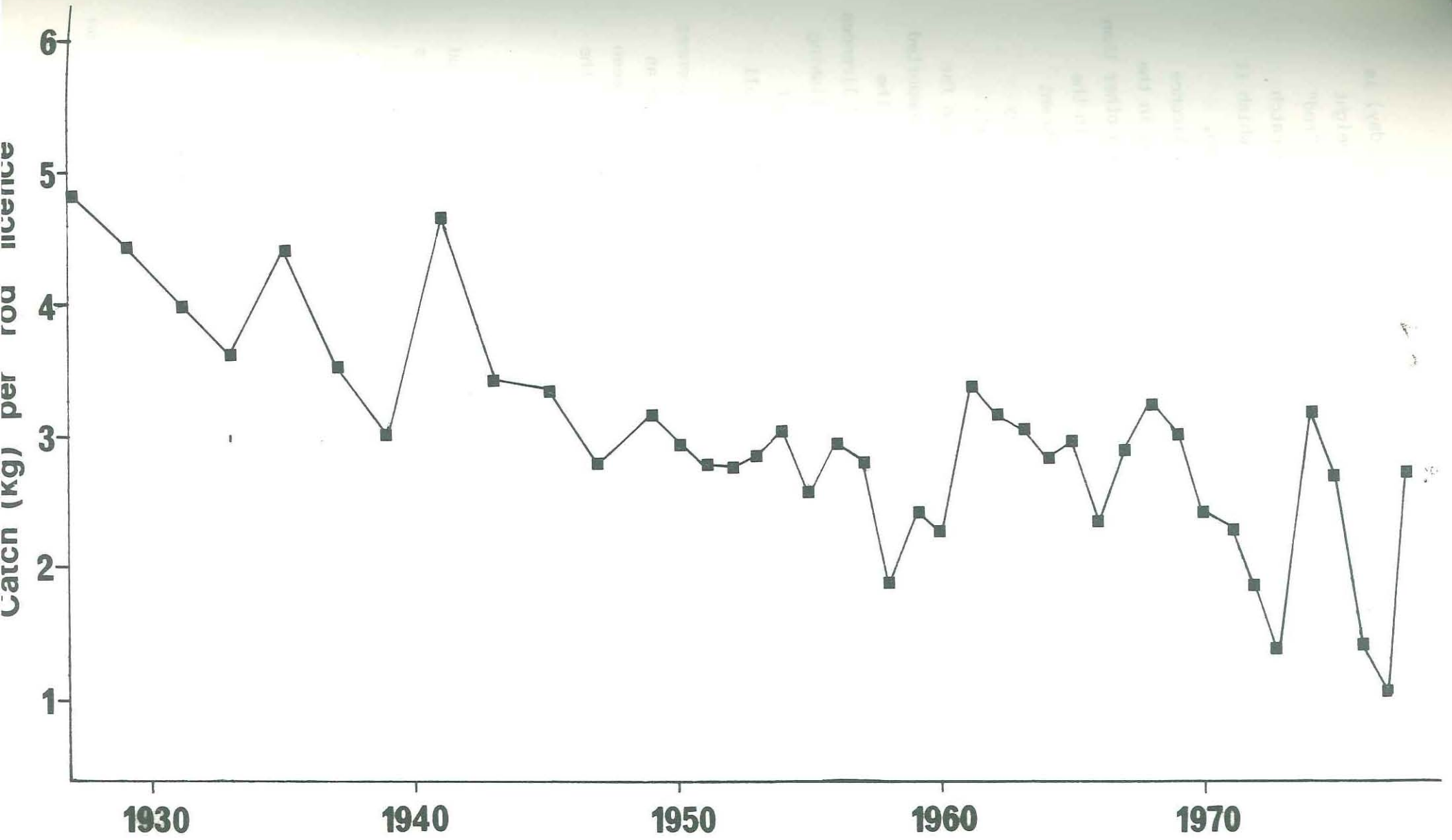

Fig. 2

Fig.2 Sea trout catch per rod licence (all categories included) between 1927 and 1978.

The catch per unit effort (alternatively expressed as per rod per day) is a difficult statistic to interpret in Irish sport fisheries; the weight of sea trout caught per licence issued (total national catch, all "rod" licences) is set out in Fig. 2. In spite of this reservation the catch per licence in Fig. 2 displays a gradual decline until 1959 after which it stabilises within the same range until the early seventies. Whelan, O'Connor and McCashin (1974) showed that the salmon catch per rod licence had been gradually declining prior to the increase in drift netting in the late 1960s after which the share of the salmon catch to all engines other than drift netters fell off. Fahy (1978 b) demonstrated similar trends in the number of sea trout taken per rod day in Connemara where the most recent statistics were in conformity with the takings per rod day reported by O'Connor and McCashin (1973) and Whelan, O'Connor and McCashin (1974). Fahy (1978 b) favoured a change in angler behaviour as the explanation for a decrease in yield per effort and such a change of effort might be supported by a brief consideration of the kind of angling licence issued within the region. While it is impossible to precisely relate fishing effort and licences purchased it is suggested here that the purchaser of an annual salmon fishing licence is likely to fish for a longer period than the holder of a sport fishing licence of shorter duration. "Annual" licences made up 27% of all licences issued in Connemara up to 1939, 18% in the 1940s, 16% in the 1950s, 4% in the 1960s and 10% in the 1970s. The total number of rod licences (all categories) issued in the region (which is not necessarily the same as the number of licences exercised in the area) fell from 3,010 issued between 1927 and 1939 to 2,000 in the 1940s and thereafter increased to 4,307 in the 1950s, to 5,362 in the 1960s and 3,647 in the 1970s (to 1978). Catch per effort was 17kg per rod up to 1939, 11kg in the 1940s and 1950s, and 8kg in the 1960s and 1970s (up to 1978). Thus according to the official statistics there was a 50% decrease in the weight of sea trout taken per rod licence issued in Connemara between the 1930s and the 1960s and 1970s. This is in general agreement with findings for catch per rod day for some of the medium sized fisheries in the region (Fahy, 1978 b).

An assessment of the catch statistics

Apart from the hiatus in the catch per rod licence data in the official statistics, referred to above, information on the rod catch per day from individual fisheries is a poor indicator to the status of stocks, human-social rather than biological factors providing an explanation for the figures (Fahy, 1978 b, 1979 a). Catch per commercial engine is preferred as an incicator to the abundance of the fish and the weight of sea trout taken

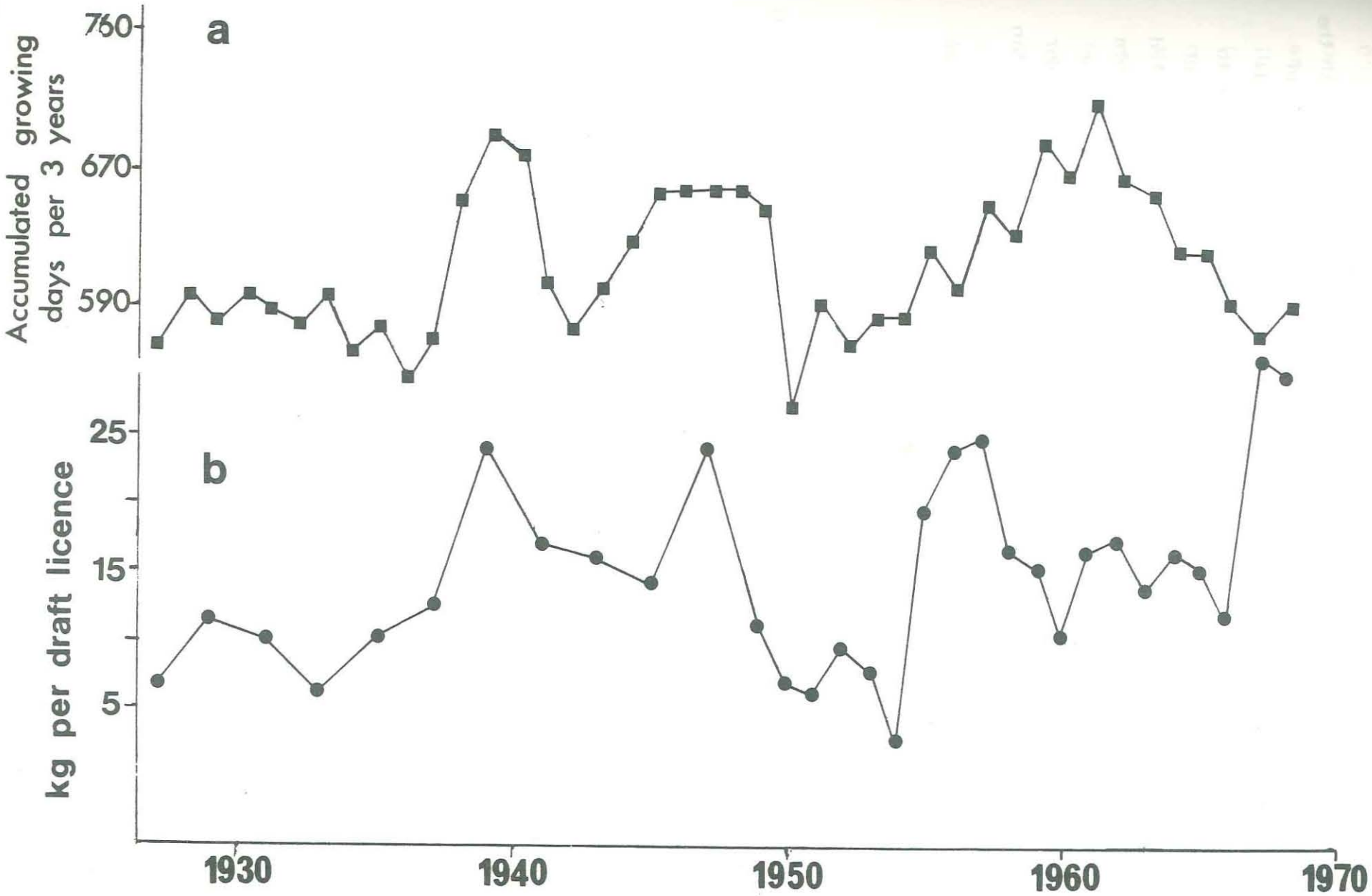

Fig.3 Accumulated growing days per three years for the period 1927 - 1969 compared with the catch per draft net licence issued in the same period.

Fig. 3

The duration of the premigratory freshwater phase of sea trout (the mean smolt age, M.S.A.) in Britain and Ireland can be shown to correlate with the length of the agricultural growing season and the number of trout migrating or displaced from a system also increases with the length of growing season (Fahy, 1980 a, 1981). By correlating number of growing days of the three years of the two year smolt phase (i.e. 0+, 1+ and 2+, the year of first migration) with climatic data it is possible to derive a theoretical M.S.A. for the period covered by the Irish sea trout catch statistics, up to 1969. In Fig. 3 variation in 3 years' accumulated growing days between 1927 and 1969 (in which year collection of these data from the meterological station in question ceased) is shown alongside the variation in draft net catch. There is sufficient information to consider only the first period of the official statistics (i.e. up to 1959). Within it catch peaks in 1939, 1947 and the later 1950s coinciding with longer growing seasons at those times are noteworthy. Between 1927 and 1959 three year accumulated growing days and draft net catches correlated highly significantly (d.f. = 19 r = +.6944 $\underline{P} < 0.001$); thereafter the relationship is lost. For the period 1927 to 1969 $\underline{P} > 0.05$ (non significant d.f. = 33 r = .2791) and within the remainder to the period in which correlation is feasible - from 1960 to 1969 - the relationship has not re-established itself (d.f. = 9 r = .5657 $\underline{P} > 0.05$).

Estimation of the sea trout catch in a recent year

Over a short period, sea trout catches by a particular method display relatively little fluctuation (Fahy, 1978 b, in press): hereunder the catch in a particular year is examined on the basis of licence returns.

Draft Nets

In 1980 601 draft net licences were issued and 164 (27.2%) were returned bearing details of catch. Average weight of individual sea trout taken was 0.60kg and the total catch by this engine was 8 0 tonnes of fish (on the basis that each licence accounted for 13.33kg of sea trout). Both the number of licences issued and the mean weight of catch per net are within the range previously calculated for this engine.

Drift Nets

Of 959 licences issued in 1980 only 72 (7.5%) were returned. A mere 15.9kg of sea trout, or 0.22kg of fish per licence were reported totalling, on this basis, 212kg of sea trout for this engine. This total approximates best to the

Rod and Line

O'Connor and Whelan (1973) and O'Connor, Whelan and McCashin (1974) presented details of sea trout catch per rod day, elicited by questionnaire, and these are summarised and placed alongside figures for the 1980 season in Table 1. The 1980 statistics derive from licence returns. Of 17,776 rod licences (all categories) issued in 1980 5.7% were returned bearing details of catch and these comprise the sample in Table 2. In every district the 1980 weight of catch per rod per day is heavier than recorded in the study with which they are compared. Cane (1980) who investigated the problems of evaluating angling returns concluded that while there is no reason to question the veracity of anglers' rod averages as calculated from returns these were always higher than recorded by an independent observer because anglers who submit returns are likely to be those who fish more successfully. However although the 1980 total catch is calculated on the basis of the data presented in Table 2 the figure is not very different from that calculated by the ESRI team. Their total was 61 tonnes of sea trout captured by anglers (46.8 tonnes by Irish anglers, the remainder by visitors). The 1980 total was 51 tonnes.

Conclusion

For the duration of the official departmental statistics the national sea trout catch has increased in response to an increase in rod licence numbers. The western seaboard appears to be producing as many sea trout as at any time. Catch per effort aspects of the rod licencing system before and after 1959 have not been compared in sufficient detail. Because effort from this source has an important influence on the total landings a detailed reappraisal of these is required as well as a reassessment of the contribution of the drift nets.

Table 1 Sea trout catch (kg) per rod day as presented in the ESRI studies and calculated from licence returns for the 1980 season

Fishery District	ERSI		1980
	Irish anglers	Visiting anglers	all anglers
Dublin	0.05	0.00	0.16
Wexford	0.27	0.05	0.32
Waterford	0.05	0.09	0.10
Lismore	0.09	0.00	0.55
Cork	0.18	0.23	0.30
Kerry	0.09	0.50	0.72
Limerick	0.05	0.14	0.34
Galway			1.23
Connemara	0.59	0.82	0.89
Ballinakill			1.07
Bangor	0.36	0.50	0.71
Ballina			0.22
Sligo	0.14	0.09	0.32
Ballyshannon			0.34
Letterkenny	0.09	0.18	0.50
Dundalk	0.18	0.18	0.39
Drogheda			0.35

Table 2 Anglers' catch in 1980 estimated on the basis of yield per licence issued

Fishery District	Number of Licence returns	Number of Licences issued	kg/returns	Estimated total (kg) (rounded)
Dublin	97	815	33	278
Wexford	70	1023	209	3,050
Waterford	134	1463	44	475
Lismore	70	737	91	960
Cork	60	926	122	1,876
Kerry	105	1420	696	9,410
Limerick	65	2079	181	5,789
Galway	55	529	282	2,714
Connemara	54	275	362	1,846
Ballinakill	37	592	223	3,571
Bangor	41	462	241	2,673
Ballina	52	1839	45	1,604
Sligo	22	470	44	950
Ballyshannon	39	1288	66	2,172
Letterkenny	91	2791	302	9,251
Dundalk	9	323	25	1,427
Drogheda	18	515	102	2,907
			Total	51102 kg

BIBLIOGRAPHY

Cane, A (1980) The use of anglers' returns in the estimation of Fishing success. Fisheries Management 11 (4) : 145-155.

Fahy, E (1977) Exploitation of Sea Trout. Technology Ireland, July/ August, 77 : 32-35.

——— (1978 a) Variation in some biological characteristics of British Sea Trout. Journal of Fish Biology 13 : 123-138.

——— (1978 b) Performance of a group of sea-trout rod fisheries, Connemara, Ireland. Fisheries Management 9 (1) : 22-31.

——— (1979 a) Performance of the Crumlin Sea Trout fishery, Co. Galway. Fisheries Leaflet No. 101, 12pp mimeo. Department of Fisheries and Forestry, Dublin.

——— (1979 b) Sea trout from the tidal waters of the River Moy. Fisheries Investigation Series Section A (Freshwater) No. 18, 11pp.

——— (1980 a) "Growing season" as a factor in sea trout production. Journal of Fish Biology, 17 : 541-546.

——— (1980 b) Sea-trout from the Currane Fishery in 1973 and 1974. Irish Fisheries Investigations, 19 : 12pp.

——— (1980 c) Eubothrium crassum in migratory trout, Salmo trutta L., in the sea. Journal of Fish Biology, 16 : 99-104.

——— (1981) The sea trout year 1980. Fishery leaflet No. 108, 13pp mimeo. Department of Fisheries and Forestry, Dublin.

——— (In press) Sea trout and their fisheries from the Dublin Fishery District.

O'Connor, R & B J Whelan (1973) An economic evaluation of Irish Salmon fishing : I : The visiting anglers. Economic & Social Research Institute. Paper No. 68.

O'Connor, R, B J Whelan & A McCashin (1974) An economic evaluation of Irish Salmon fishing : II : The Irish anglers. Economic & Social Research Institu'e. Paper No. 75 : 96pp.

Southern, R (1934) The salmon industry. A statistical survey of the industry. Irish Trade Journal, 105-110.

Went, A E J (1938) The salmon fishery. A statistical survey of the industry. Irish Trade Journal (1) : 13 : 8-13; 79-86.

_____ (1956) The Irish drift net fishery for salmon. Journal of the Department of Agriculture, Dublin 52 : 131-145

_____ (1957) Notes on the Irish salmon industry, (1924/1955). Journal of the Department of Agriculture 53 : 70-89.

_____ (1967) Review of the Irish salmon industry. Irish Fisheries Investigations (A) 1 : 1-25.

Whelan, B J, R O'Connor & A McCashin (1974) An economic evaluation of Irish salmon fishing. III The Commercial Fishermen. Economic and Social Research Institute : paper No. 78.